

CHAPTER 6

TIE PLATES, RAIL FASTENINGS, AND OTHER TRACK MATERIALS

6-1 General.

a. Tie plates, rail fastenings, and other track materials shall be the proper size and type as specified in TM 5-850-2/AFM 88-7, Chap. 2 and TM 5-627/AFM 91—33 and shall conform to the requirements of chapters 4 and 5 of the *AREA Manual For Railway Engineering*.

b. Tie plates, rail fastenings, and other track materials shall not be flame cut or otherwise altered.

c. Tie plates, rail fastenings, and other track materials which are of improper type, broken, or

otherwise defective shall be replaced with the proper size and type material.

6-2. Tie plates.

a. *Use.* Tie plates distribute the applied loads from the rail to the tie as well as assist in keeping the rail in position. Their use is especially important on curves where they provide additional lateral restraint.

b. *Type.* Tie plates may be of either the single shoulder type (fig 6-1) or the double shoulder type (fig 6-2).

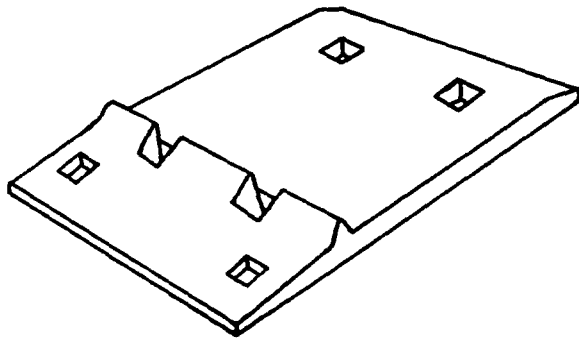


Figure 6-1. Single shoulder tie plate.

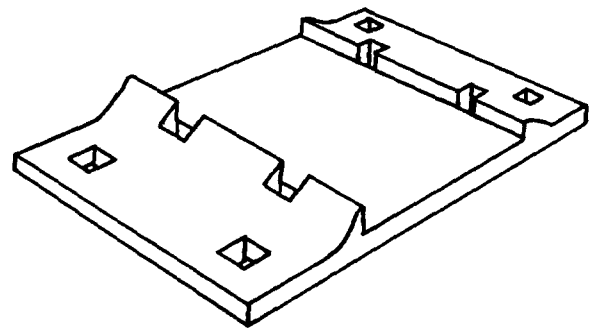


Figure 6-2. Double shoulder tie plate.

c. *Installation.* For track without tie plates, plates shall be installed during the next track rehabilitation or rail replacement.

6-3. Spikes

a. The rail shall have a sufficient number of fasteners (spikes) to effectively maintain gage and provide sufficient rail restraint.

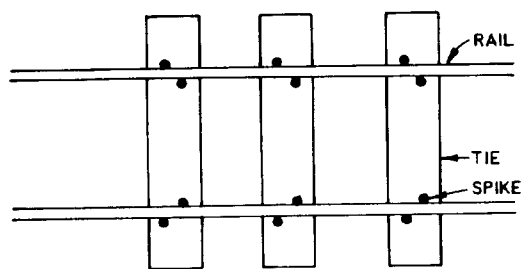
b. *Spikes shall be:*

(1) Of proper size for the tie plates used.

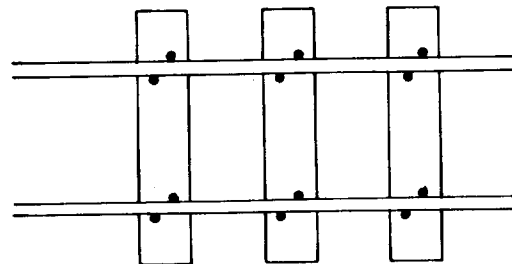
(2) Driven vertical and square with the rail.
 (3) Either of the cut or screw type.
 (4) Driven with approximately $\frac{1}{8}$ (0.125) inch of space remaining between the head of the spike and the base of the rail.

c. *Spiking pattern.*

(1) On tangent track and curves less than 4 degrees, spikes shall be installed as shown in figure 6-3.



CORRECT



INCORRECT

Figure 6-3. Spiking pattern for tangents and curves less than 4 degrees.

(2) On curves 4 degrees and greater and on the curved side of turnouts, the use of an additional spike as shown in figure 6-4 is recommended.

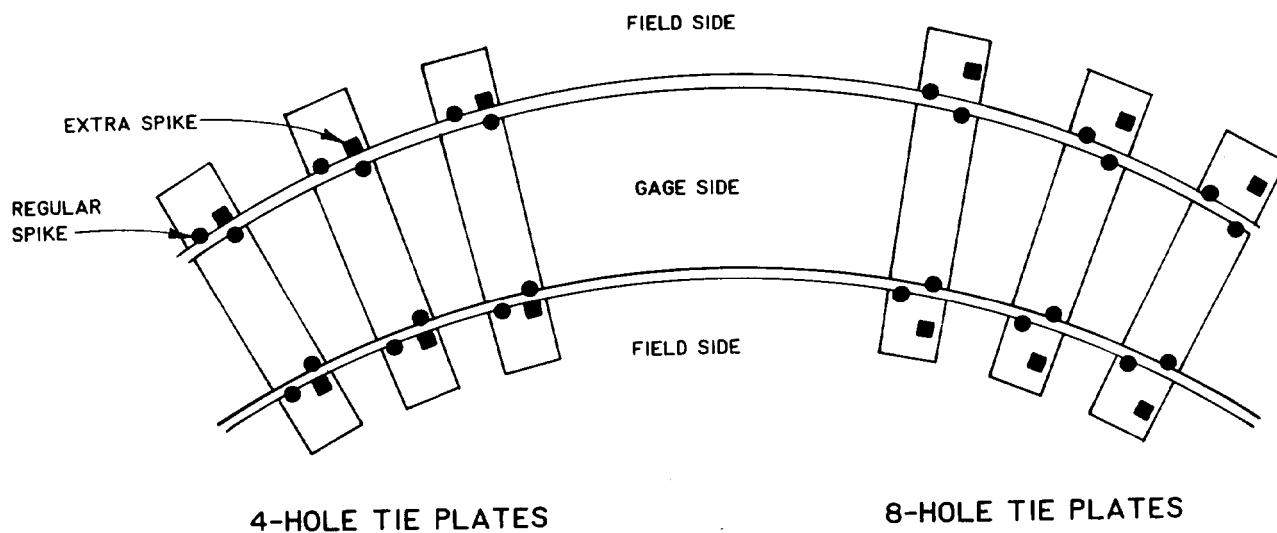


Figure 6-4. Spiking pattern for curves 4 degrees and greater.

(3) Spikes in angle bars. Spikes shall not be installed through the slots in skirted-type, slotted joint bars (angle bars) as shown in figure 6-5.

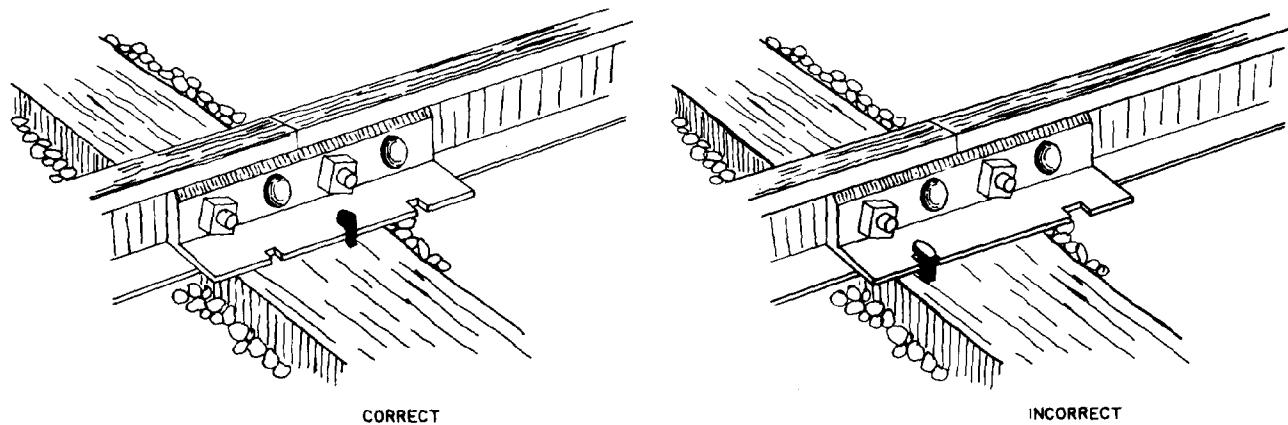


Figure 6-5. Spiking through angle bars.

(4) Correction on incorrect spiking patterns. An incorrect spiking pattern by itself is not a cause for removing and re-driving spikes. However, an incorrect spiking pattern shall be corrected when other maintenance requires the spikes to be removed. Old spike holes shall be plugged to prevent accelerated tie deterioration.

d. Missing and loose spikes. Missing spikes shall be replaced. Old spike holes shall be plugged with a treated tie plug prior to replacing the spikes. Loose spikes shall be removed, the holes plugged, and the spikes re-driven.

e. Spikes beneath rail base. Where the head of a spike has become lodged beneath the base of a rail, the spike shall be removed and properly re-driven. A spike lodged beneath the rail base is an undesirable condition that can lead to a broken rail base.

6-4. Joints.

a. Joint bars. Rails shall be joined with proper factory designed and constructed joint bars. Joint bars may not be altered with a flame in any manner,

including the bolt holes. Joint bars not meeting these requirements shall be replaced.

b. Compromise joints. Rails of different size or section shall be joined with proper factory designed and constructed compromise bars, taper rails, or offset welds.

c. Cracked or broken joint bars. Cracked or broken joint bars shall be replaced.

(1) If one joint bar at a rail joint is cracked or broken between the center holes, operations over that location shall not exceed 10 mph.

(2) If both joint bars at a rail joint are cracked between the center holes, operations over that location shall not exceed 5 mph.

(3) Operations shall not be permitted over any location where both joint bars are broken, or where worn or loose joint bars allow vertical movement of either rail with respect to the other.

d. Bolts. Each joint shall be bolted with at least two bolts in each rail.

(1) All bolts shall be of proper size and tightly in place. A bolt is not considered tight unless the spring washer is compressed closed and is flat against the joint bar, as shown in figure 6-6.

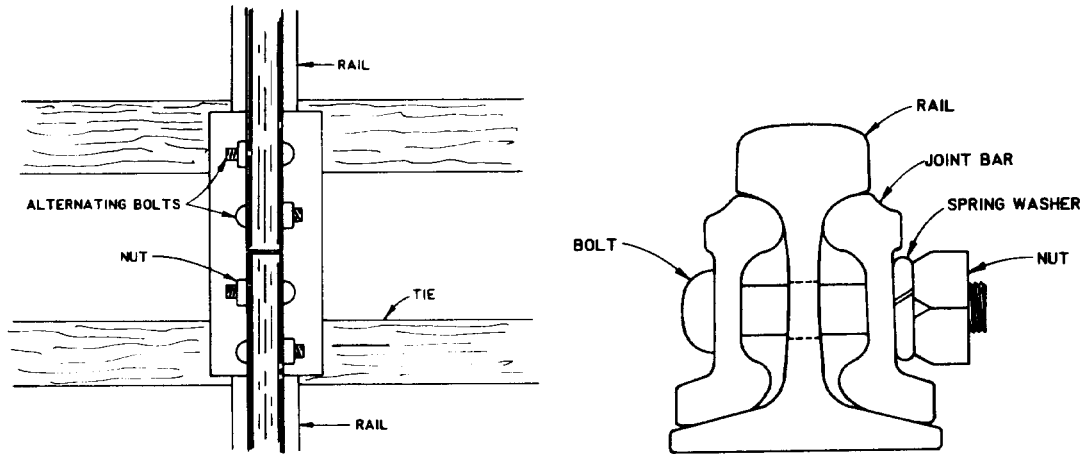


Figure 6-6. Proper bolt installation.

(2) Bolts which cannot be tightened shall be replaced. Missing bolts shall be replaced.

(3) Bolts shall be installed with spring lock washers. Nuts shall be installed against the spring lock washer as shown in figure 6-6. At least one full bolt thread shall extend past the outside of the nut.

(4) Bolts shall be installed so that the nuts will be alternately on the inside and outside of the rail as shown in figure 6-6.

(5) Whenever bolts and joint bars are removed, the rail in the joint area and the contact surfaces of the joint bar shall be cleaned (wire brushed) and lubrication applied to the joint bar and the bolt threads. New joint bars and bolts shall be lubricated before installation.

e. Loose and missing bolts.

(1) If all bolts at a joint are loose or if there is only one bolt through each rail, operations shall not exceed 10 mph.

(2) Operations shall not be permitted over locations where all bolts in one rail are missing.

f. Rail end mismatch.

(1) At any location where rail end mismatch exceeds $\frac{3}{16}$ (0.1875) inch on the tread portion or gage side of the rail, operations shall not exceed 10 mph.

(2) Operations shall not be permitted over locations where the rail end mismatch exceeds $\frac{1}{4}$ (0.25) inch.

g. Joint gap.

(1) At any location where the gap between rail ends exceeds 1 (1.00) inch, operations shall not exceed 10 mph.

(2) Operations shall not be permitted over locations where the gap exceeds 2 inches.

h. Joints in restricted areas. Whenever a joint is installed within 20 feet of a road crossing, the outer perimeter of any structure, or any location which restricts access to the joint, it is recommended that the joint be welded.

6-5. Rail anchors.

a. Rail anchors help prevent the longitudinal movement of rails commonly known as “running” or “creeping”. Rail anchors should be used at locations where the track is subject to serious movement from rail expansion or traffic conditions.

b. Rules for anchor application. General rules on the use of rail anchors are:

(1) Anchors shall be applied to the gage side of the rail against the same tie face on opposite rails.

(2) Anchors shall grip the base of the rail firmly and have full bearing against the face of the tie.

(3) When the bearing of the rail anchor against the tie has been disturbed by removal of the tie, the anchor shall be removed and reset.

(4) Anchors shall not be moved by driving them along the rail.

(5) Skewed ties shall be straightened before applying rail anchors.

Rail anchors not meeting requirements of paragraphs 6-5 *a* and *b* should be removed and reset.

c. Anchor locations.

(1) Where used, a minimum of eight anchors per 39 foot of rail is recommended as shown in figure 6-7. Additional anchors should be used as needed, and they should be installed four per tie with approximately uniform spacing along the rail.

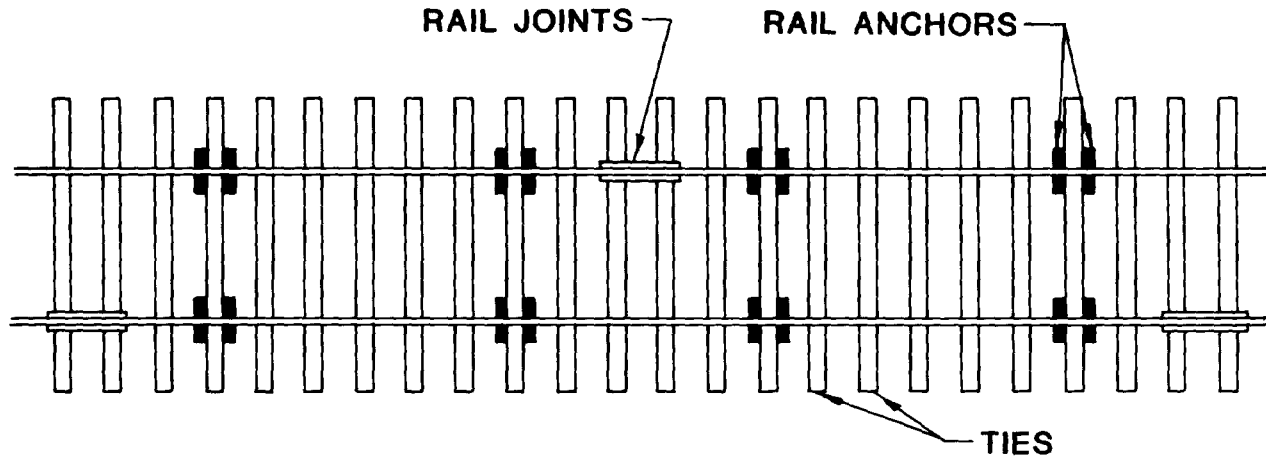


Figure 6-7. Recommended minimum anchoring pattern.

(2) *At open deck bridges.* Where anchors are used on track approaching open deck bridges, every third tie should be box anchored (four anchors per tie) for at least two rail lengths off each end of the bridge. No anchors shall be applied on the bridge itself.

(3) *At rail crossings.* Where anchors are used on track approaching rail crossings, every third tie should be box anchored (four anchors per tie) for at least two rail lengths in all directions from the crossing.

6-6. Gage rods.

a. Use. Gage rods are used to help maintain proper track gage but are not a substitute for good track maintenance and good tie conditions. Gage rods are sometimes used at the following locations:

(1) On sharp curves where there is difficulty holding the gage.

(2) In turnouts just ahead of the switch points and on the curved closure rails.

b. Spacing. Where gage rods are used in sharp curves, two to four rods should be installed for each rail length. Rods should be installed at evenly spaced intervals along the rail length.

c. Application. Gage rods should be installed at right angles to the rail with the jaws firmly gripping the base of the rail.

d. Maintenance.

(1) Gage rods shall be kept tight while maintaining the proper track gage.

(2) Bent or broken gage rods shall be replaced where the track conditions warrant their continued use.